

REMARKS/ARGUMENT

Regarding the Claims in General:

Claims 1-21 are now pending. Claims 1, 2, 5-9, 11, 15, 16, and 18 have been amended to better highlight various features of the invention, to improve the form thereof and (in the case of claims 8, 9, and 11) to address objections raised by the Examiner.

The scope of the amended claims has not, however, been narrowed.

New claims 20 and 21 have been added to provide applicants with additional protection to which they appear to be entitled in light of the known prior art.

Regarding the Objections to the Claims:

The amendments to claims 8, 9, and 11 should overcome the informalities noted by the Examiner. Applicants, however, request reconsideration and withdrawal of the objection to claim 12. The electronic components remain mounted on the recited moving means while unsingulated, and also after singulation. Claim 12 is therefore correct as originally filed.

Regarding the Prior Art Rejections:

In the outstanding Office Action, claims 1-13, and 15-18 were rejected as anticipated by Atkins et al. U.S. Patent 5,570,032 (Atkins), claim 14 was rejected as obvious over Atkins in view of Khandros U.S. Patent 6,064,213 (Khandros), and claim 19 was rejected as obvious over Atkins. Applicants respectfully submit that these rejections are not proper and should be withdrawn.

As noted in the specification, an objective of the invention is to test the devices after they are separated electrically. The problem is to test the singulated electronic devices individually without slowing down the testing process. (see page 3, lines 19-23) The invention is capable of testing an array of singulated electronic components en masse. ^{in a batch}
_{or as a whole}

This is entirely different from what is taught or suggested by Atkins et al. According to the patent, the wafer undergoes burn-in and testing *before* singulation (see Col. 6, lines 26-42).

This distinction over Atkins et al. is clearly stated in claim 1 as amended. Specifically, claim 1 calls for the steps of:

mounting unsingulated electronic components onto the mounting means;

singulating the components to physically separate them; and

testing the singulated electronic components for defects while they are mounted on the mounting means and without removal therefrom.

✓ Thus, the components are singulated *then* tested - - the exact opposite of what Atkins et al. teach.

The closest Atkins et al. come to suggesting separation before testing is at Col. 6, lines 53-58, where the patent states that "[p]rior to mating the wafer with the vessel, the wafer may be *semi-scribed or scored* along the die boundaries". However, the patent cautions that "[t]his scribing is not done to the degree where it would jeopardize the mechanical integrity of the wafer and thus the alignment of the wafer pads to the PCB." This is clearly not a suggestion of singulation before testing. Indeed, mechanical separation of the individual dice is expressed prohibited, in order to maintain alignment between the wafer pads to the PCB.

Apparatus claim.8, as amended recites:

a mounting means for mounting electronic components;

a singulating device for singulating the said array of electronic components; and

a testing device operative to test each of the said *singulated* components for defects;

whereby singulation and *testing of singulated electronic components* are conducted while they are mounted on the mounting means without removal therefrom.

As may be seen from the emphasized text, the testing device is operative to test singulated components, not unsingulated components. As Atkins et al. do not teach or suggest testing of singulated components, the reference does not anticipate amended claim 8 for the reasons stated above.

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Claims 2-7, and 20-21 are dependent on claim 1 and claims 9-13, and 15-18 are dependent on claim 8, and are therefore patentable for the reasons stated above. Additionally, claim 7, as amended recites that:

the mounting means comprises a film of laser transparent tape with an adhesive on one surface; wherein:

each electronic component is mounted on the adhesive surface of the film of transparent tape; and

marking is effected by passing the laser beam generated by the laser device through the film of laser transparent tape toward the adhesive surface thereof.

According to Atkins et al., the adhesive surface is a coating or layer of sticky tape or epoxy on the vessel (see Col. 5, lines 41-49). Thus, the recited method of marking, i.e., "... by passing the laser beam generated by the laser device through the film of laser transparent tape toward the adhesive surface thereof" is not physically possible with Atkins. Claim 7 is patentable for this additional reason. v

Correspondingly, claim 18 specifies that:

the mounting means comprises a film of transparent tape with an adhesive surface on which electronic components are mountable; and

the laser device is operative to direct the laser beam generated thereby through the film toward the adhesive surface thereof to mark a surface of each electronic component that is components mounted on said adhesive surface.

This claim is additionally patentable for the same reasons as claim 7.

Claim 12 additionally calls for moving means "... adapted to move the electronic components in linear and rotary axes ..." The corresponding structure in Atkins et al., as described in the text cited by the Examiner "... may comprise conveyor belts, automated carts or racks. ..." These is no suggestion in the patent that such devices move the electronic components in rotary axes. m
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With respect to claim 14, the deficiencies in Atkins et al. discussed in connection with base claim 8 are not overcome by resort to Khandros et al. Claim 14 calls for:

... a vacuum chuck for holding in position the support frame and film [as recited in claim 13] on which electronic components are mountable, during the singulation, testing and marking.

Although Khandros discloses a vacuum chuck, it does not also hold a support frame and film on which electronic components are mountable. A wafer is placed directly on the top surface [104], which is similar to the design of Atkins.


Nor is claim 19 obvious over Atkins et al. alone, as asserted by the Examiner. This claim calls for:

... an inverting device to invert the transparent tape to expose the surface of each electronic component that is mounted on said adhesive surface of the transparent tape to the laser device for marking.

In Atkins et al., the robot acts on a wafer *per se* (see Col. 5, lines 17-18), and not on a tape which carries singulated circuit elements, and the vacuum arm functions to place the wafer *into* the vessel for testing (see Col. 6, lines 4-5). Neither of these devices act on the mounting means, i.e., the vessel. Moreover, Atkins et al. neither teach nor suggest using the robot and the vacuum arm to *invert* anything, or to prepare an electronic component for laser marking. The only suggestion for any of this is found in applicants' own disclosure.

In view of the foregoing, favorable reconsideration and allowance of this application are respectfully solicited.

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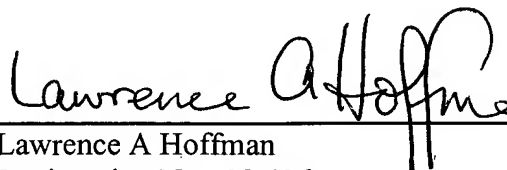
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